

$$y = \sqrt{x f(x)} \Rightarrow x f(x) \geq 0 \Rightarrow \begin{cases} x \geq 0, f(x) \geq 0 \Rightarrow [2, 5] \\ x < 0, f(x) < 0 \Rightarrow [-5, 0] \end{cases} \Rightarrow Df = [-5, 0] \cup [2, 5]$$

داده تابع $y = \sqrt{\frac{-x}{f(x)}}$ حاصل چند عدد صحیح می شود؟ در ازای این مقادیر در نمودار صفری دهد نه اینجوری و چون

$$f(x) \neq 0 \Rightarrow \begin{cases} x \neq 5 \\ x \neq 2 \\ x \neq 0 \\ x \neq -3 \end{cases} \Rightarrow \frac{-3}{x} + \frac{0}{x} + \frac{2}{x} - \frac{5}{x} = \Rightarrow Df = (-\frac{3}{2}, 0) \cup (0, 2)$$

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$$\begin{aligned} f(x) - 2f(2) &= x^2 - 3x + 4 \\ f(2) - 2f(2) &= 4 - 6 + 4 \\ -f(2) &= 2 \\ f(2) &= -2 \end{aligned} \Rightarrow \begin{aligned} f(-2) - 2f(2) &= (-2)^2 - 3(-2) + 4 \\ f(-2) - 2(-2) &= 4 + 4 + 4 \\ f(-2) + 4 &= 12 \\ f(-2) &= 8 \end{aligned}$$

$$f(x) = \begin{cases} x - \sqrt{x+4} & x > 3 \\ 2x+3 & x \leq 3 \end{cases} \quad \begin{aligned} f(1) &= 2+3=5 \\ f(5) &= 5 - \sqrt{9} = 2 \end{aligned}$$

$$f(f(5)) + f(f(1)) \Rightarrow f(2) + f(5) = (2+3) + (5 - \sqrt{9}) = 7+2=9$$

$$\begin{aligned} f(x) &= ax^2 - bx + 2 \\ f(x-1) - f(x) &= 4x+2 \\ f(x-1) &= a(x-1)^2 - b(x-1) + 2 \Rightarrow a(x^2 - 2x + 1) - bx + b + 2 \Rightarrow ax^2 - 2ax + a - bx + b + 2 \end{aligned}$$

$$\begin{aligned} f(x-1) - f(x) &= (ax^2 - 2ax + a - bx + b + 2) - (ax^2 - bx + 2) \\ &= -2ax + a + b \rightarrow -2ax + a + b = 4x + 2 \\ -2a &= 4 \rightarrow a = -2 \\ a + b &= 2 \rightarrow b = 4 \Rightarrow a - b = -2 - 4 = -6 \end{aligned}$$

$f(x) = x^2 - 3x + 1$ $\frac{xf(x) + f(-1)}{f'(x)}$	$f(x) = 9 - 9 + 1 = 1$ $f(-1) = 1 + 3 + 1 = 5 \Rightarrow \frac{1+5}{(-1)^2} = \frac{6}{1} = 6$ $f(x) = 1 - 4 + 1 = -1$	6
$f(x) \Rightarrow \begin{cases} x^2 + 1 & x \geq 1 \\ x^2 & x < 1 \end{cases}$ $\frac{xf(x) - xf(-x)}{f(x)}$	$f(x) = 1 + 1 = 2$ $f(-1) = 1$ $f(x) = 4 + 1 = 5$ $\Rightarrow \frac{(2 \times 1) - 1}{2} = \frac{2 - 1}{2} = \frac{1}{2}$	$\frac{1}{2}$
$f = \{(1, 4), (2, 1), (3, 1), (1, 4)\}$ $\frac{f(f(x)) - f(f(y))}{f(1) - 2} = \frac{f(1) - f(2)}{f(1) - 2} = \frac{4 - 1}{4 - 2} = \frac{3}{2}$		1
$f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 5}$ $f(f(\sqrt{x} - 1))$ $f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 5}$ $f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 5}$ $f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 5}$	$x = \sqrt{x} - 1 \rightarrow x + 1 = \sqrt{x}$ $x^2 + 4x + 9 = (x+1)^2 + 5 = (\sqrt{x})^2 + 5 = 1$ $x^2 + 4x + 5 = (x+1)^2 + 1 = (\sqrt{x})^2 + 1 = 2$ $\frac{1}{2} = \frac{1}{2}$	9
$f(x) = x^2 + \frac{1}{x^2}$ $(f(\sqrt{x}))^2 - f(x)$	$f(\sqrt{x}) = (\sqrt{x})^2 + \frac{1}{(\sqrt{x})^2} = x + \frac{1}{x}$ $(f(\sqrt{x}))^2 - f(x) = (x + \frac{1}{x})^2 - (x^2 + \frac{1}{x^2})$ $= x^2 + 2 + \frac{1}{x^2} - x^2 - \frac{1}{x^2} = 2$	10